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DIRECTORATE OF
INTELLIGENCE

Industrial Facilities
(Non-Military)

Basic Imagery Interpretation Report

Cement Plants

North Korea

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CENTRAL INTELLIGENCE AGENCY
Directorate of Intelligence
Imagery Analysis Service

ABSTRACT

This is the initial basic report on eight cement plants which comprise North Korea's total known cement industry. Six of the plants were complete when they were first seen on overhead photography -- four in 1950 and two in 1964. The other two plants, at Kujang-dong and Sunchon, have been built since 1968.

The eight plants have a total of 21 rotary kilns. At least 17 of the kilns were operating when they were last seen on photography. The two newer plants have not yet been observed in full operation.

Analysis of two other facilities listed as cement plants in the Basic Encyclopedia shows that they do not produce cement. We have identified them as the Kimchaek Probable Ore Processing Facility and the Kanggye Probable Cement Products Plant.

This report includes an annotated photograph and a chronological summary of construction and operational status of each plant.

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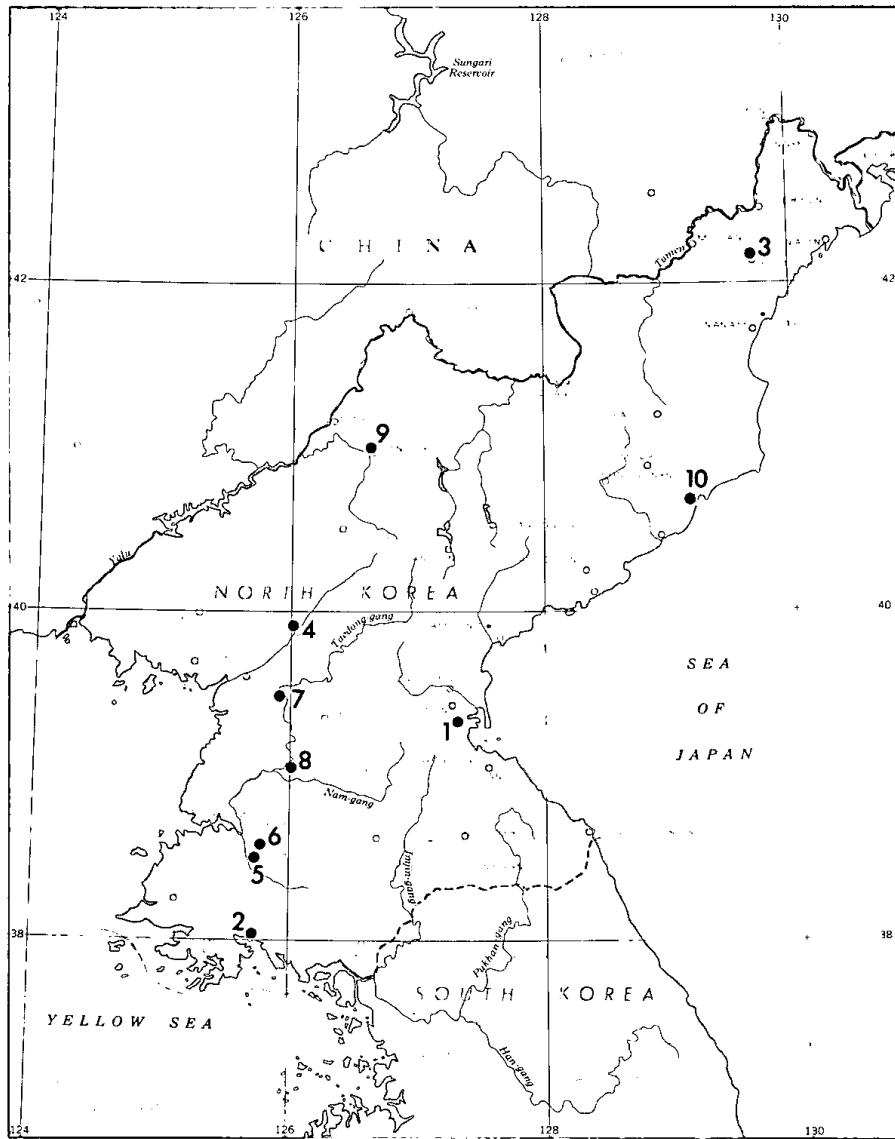


FIGURE 1. LOCATION MAP.

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INTRODUCTION

The cement plants in North Korea are distributed fairly uniformly throughout the populated portions of the country (Figure 1) due to the availability of raw materials. Information relative to location, environment, and related installations is presented with the individual descriptions of the plants.

Both the wet and dry processes are employed for cement production in North Korea. The processes are essentially the same except for the method of preparing raw materials. In the dry process the raw materials are crushed, dried in small rotary kilns, and then fine ground before entering the large rotary kiln. In the wet process a water-clay slurry is added to the raw material prior to the fine grinding in lieu of the drying process. The wet process kilns are frequently longer in order to evaporate the excess water.

There are two kinds of measurements given in this report. The first is the approximate length and width of exposed rotary kilns. The second is the length and width of the roof cover over enclosed kilns. In measuring exposed kilns, a total of 15 feet is added to the length of the visible portion of each kiln to compensate for that portion of the kiln that cannot be seen at both ends.

The following plants are included in this report (see Figure 1):

1. Chonnae Cement Plant.
2. Haeju Cement Company Chosen.
3. Komusan Cement Plant.
4. Kujang-dong Cement Plant.
5. Ma-dong Cement Plant No. 1.
6. Ma-dong Cement Plant No. 2.
7. Sunchon Cement Plant.
8. Sungho-dong Cement Plant.
9. Kanggye Probable Concrete Products Plant.
10. Kimchaek Probable Ore Processing Plant.

Requirement

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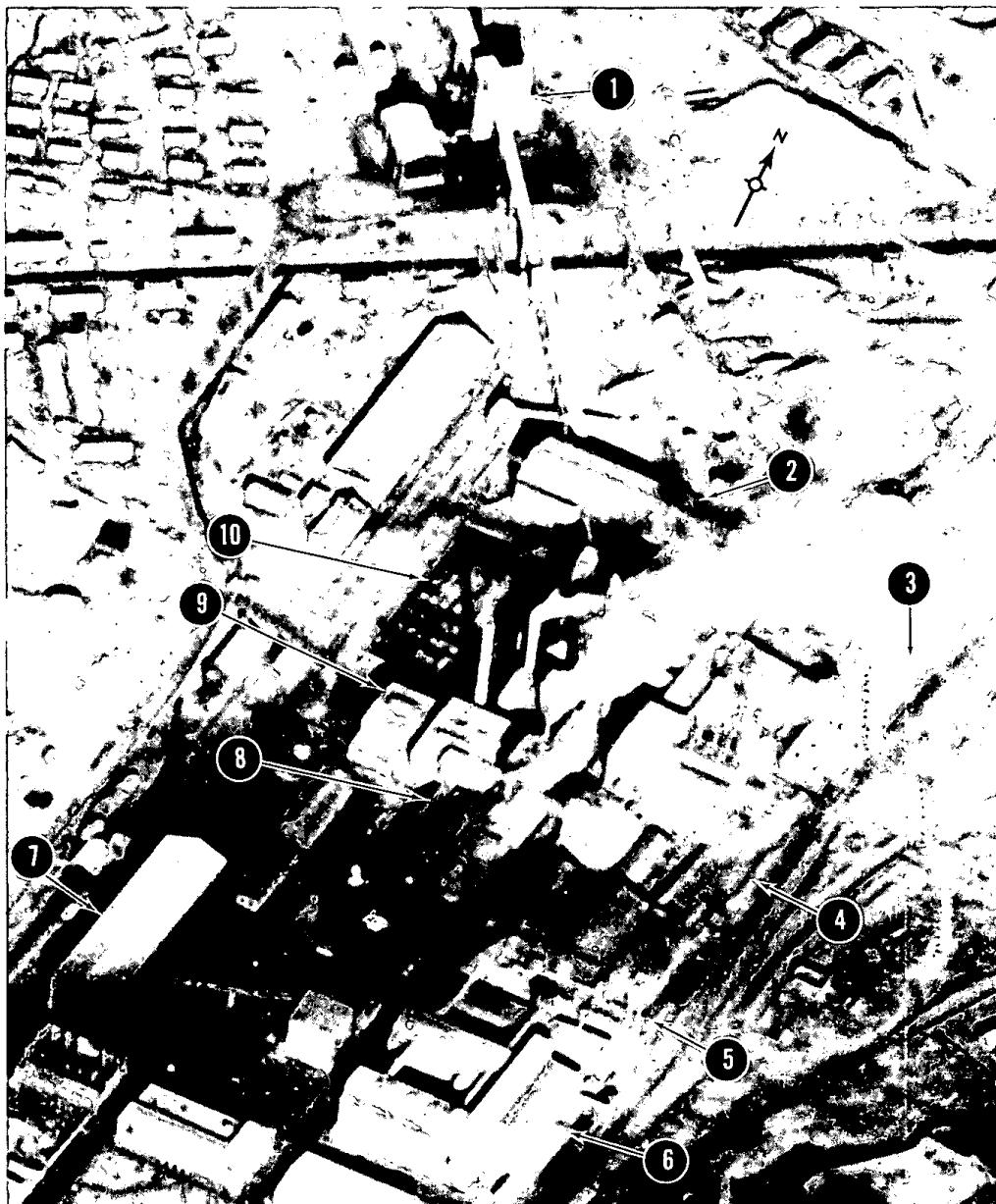


FIGURE 2. CHONNAM CEMENT PLANT.

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Key to Annotations

Item	Description
1	Limestone receiving
2	Limestone storage
3	Limestone preparation
4	Clinker storage
5	Finishing mill
6	Final product storage/shipping
7	Coal receiving
8	Kiln building
9	Thermal power plant
10	Spray pond

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INSTALLATION OR ACTIVITY NAME		COUNTRY
Chonnae Cement Plant		KN
UTM COORDINATES	GEOGRAPHIC COORDINATES	25X1
52SCU460589	39-22-10N 127-12-50E	
MAP REFERENCE		
548th RTG. USATC, Series 200, Sheet M0380-4HL, 4th ed. Apr 68, Scale 1:200,000 (SECRET)		25X1
LATEST IMAGERY USED	NEGATION DATE (If required)	
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BASIC DESCRIPTION

Chonnae Cement Plant is located on the northwestern edge of Chonnae, approximately 36 nautical miles (nm) south of Hamhung. The plant is rail and road served and is apparently unsecured. It occupies an area about 2,000 by 550 feet and contains about 25 acres.

This plant produces cement using the dry process. Raw materials are obtained from a quarry near the plant. Two rotary kilns are enclosed in a kiln building measuring approximately 500 by 115 feet (see Figure 2).

Other major plant facilities include a large limestone preparation area, a coal receiving area, a clinker storage building, a finishing mill, and a final product storage/shipping facility. A thermal power plant with a spray pond converts waste heat into electricity for plant use.

This plant appeared complete when first seen on interpretable imagery of November 1950. By May 1963, the coal receiving facility had been expanded and several small buildings had been added to the shipping area. Since May 1963, no additional plant expansion has been observed.

The plant was not operating on the November 1950 imagery. It was operating on all subsequent coverage, as indicated by smoke emanating from the stacks. The spray ponds were operating on the same coverage, indicating that the power plant was in operation.

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INSTALLATION OR ACTIVITY NAME		COUNTRY
Haeju Cement Company Chosen		KN
UTM COORDINATES 51SYC380079	GEOGRAPHIC COORDINATES 37-59-25N 125-42-40E	25X1
MAP REFERENCE 2nd RTS. USATC, Series 200. Sheet M0380-12HL. 4th ed. Scale 1:200,000 (SECRET)		
LATEST IMAGERY USED	NEGATION DATE (If required)	25X1
	NA	

BASIC DESCRIPTION

Haeju Cement Company Chosen is located 2.8 nm south of Haeju on a small, 80-acre peninsula in Haeju Bay. The plant is road and rail served and has a small port facility. It occupies an area approximately 1,200 by 1,000 feet and contains about 52 acres. Guardhouses are located at the road entrance gate and at the northeastern edge of the plant. A forge shop, foundry building, and several small repair shops are also on the peninsula. They may support the plant, or may be separate small industries.

This plant produces cement using the wet process. Raw materials are brought in by barge and rail. Three rotary kilns, each with a dust catcher, are enclosed in a kiln building measuring 390 by 120 feet (this measurement excludes the dust-catching equipment area).

Other major plant components include a primary grinding section, ten mixing and blending silos, a gypsum preparation facility, a coal receiving and storage building, a coal grinding building, and a finishing mill (see Figure 3). A thermal power plant with a spray pond converts waste heat into electricity for plant use.

The plant had three kilns and two stacks when first observed on photography of October 1950. At that time, the present coal storage area was the primary grinding area, and it was connected to the port facility by a large conveyor. Photography of March 1965 showed some plant expansion and modification. The old primary grinding area had been converted to a coal receiving and storage area, with a wing added for coal grinding. In addition, the large conveyor from the port facility had been removed. Since 1965, the only changes observed at the plant were the doubling of the spray pond area seen on the October 1969 coverage, and two new storage silos seen under construction in April 1970.

The plant was observed operating on all referenced imagery except that of October 1950. Smoke was coming from two of the three stacks in November 1966 and October 1969, from at least one stack in November 1968, and from all three stacks on the other coverages. The spray pond was observed operating on all referenced imagery except October 1950, indicating that the power plant was operating.

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FIGURE 4. KOMUSAN CEMENT PLANT,

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Key to Annotations

Item	Description
1	Coal storage and preparation facility
2	Finished-product storage silos
3	Bagging and shipping facility
4	Finishing mill
5	Raw materials receiving and primary grinding
6	Thermal power plant
7	Kiln building (2 rotary kilns)
8	Clinker storage

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INSTALLATION OR ACTIVITY NAME		COUNTRY
Komusan Cement Plant		KN
UTM COORDINATES	GEOGRAPHIC COORDINATES	25X1
52TEB580360	42-07-10N 129-41-50E	
MAP REFERENCE		
AC1C. USATC, Series 200, Sheet 0290-15HL, 3rd ed, Aug 64, Scale 1:200,000 (SECRET)		
LATEST IMAGERY USED	NEGATION DATE (If required)	25X1
	NA	

BASIC DESCRIPTION

Komusan Cement Plant is located on the northwest edge of Komusan, about 21 nm northwest of Chongjin. The plant is road and rail served. No security measures can be identified on the available small-scale photography. The plant occupies an area approximately 1,300 by 1,000 feet and contains about 30 acres.

This plant produces cement using the dry process. Raw materials are obtained from a nearby quarry. The plant has two rotary kilns enclosed in a kiln building measuring approximately 335 by 70 feet (see Figure 4).

Other major plant components include a raw materials receiving and primary grinding area, a bagging and shipping facility, a finishing mill, and a thermal power plant.

The plant was complete and operational when first seen on photography of February 1964. No additional construction has been observed.

Both the cement plant and the thermal power plant were operating in February 1964. Smoke was observed emanating from the stacks at both facilities. The power plant has not been observed in operation since that time. The cement plant has been operating on all subsequent imagery except that of December 1965 and December 1969.

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FIGURE 5. KUJANG-DONG CEMENT PLANT,

Key to Annotations

Item	Description
1	Finished-product storage silos (4)
2	Bagging and shipping facility
3	Primary grinding
4	Raw materials receiving
5	Mixing and blending silos (4)
6	Rotary kiln
7	Clinker storage
8	Finishing mill

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INSTALLATION OR ACTIVITY NAME			COUNTRY		
Kujang-dong Cement Plant			KN		
UTM COORDINATES 51SYE480150	GEOGRAPHIC COORDINATES 39-51-40N 126-03-15E		BE NUMBER None	COMIREX NO. None	NIETB NO. None
MAP REFERENCE 15th RTS. USATC, Series 200, Sheet M0380-3HL, 5th ed, Feb 68, Scale 1:200,000 (SECRET)					
LATEST IMAGERY USED		NEGATION DATE (If required) NA			
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BASIC DESCRIPTION

The Kujang-dong Cement Plant is located 1.5 nm west of Kujang-dong and 13 nm northeast of Tokchon. The plant is road and rail served and partially secured by a wall. It occupies an area approximately 800 by 350 feet and contains 10 acres.

This plant produces cement using the wet process. Raw materials are obtained from a nearby quarry. The plant has one rotary kiln measuring about 270 feet in length (see Figure 5). The small scale of the photography precludes an accurate determination of kiln diameter.

Other major plant components include a finishing mill, a primary grinding area, four mixing and blending silos, and a bagging and shipping facility. No connection was observed from the main plant to the four finished-product storage silos.

A detailed construction chronology is precluded by small-scale, poor-quality imagery. The plant stack was observed in February 1968, but no other plant facilities were discernible. The plant appeared externally complete in September 1968 except for the kiln not being in place. The kiln was complete in November 1968. The plant was observed operating for the first time in September 1970 when light smoke was seen emanating from the stack.

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FIGURE 6. MA-DONG CEMENT PLANT NO. 1,

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Key to Annotations

Item	Description
1	Possible thermal power plant
2	Raw materials receiving
3	Raw materials primary grinding
4	Slurry tank (1)
5	Mixing and blending silos (5)
6	Finishing mill
7	Final product storage silos (6) and shipping
8	Clinker storage
9	Coal receiving, storage, and grinding
10	Rotary kilns (2)

INSTALLATION OR ACTIVITY NAME		COUNTRY
Ma-dong Cement Plant No. 1		KN
UTM COORDINATES 51SYC472601	GEOGRAPHIC COORDINATES 38-27-35N 125-50-02E	25X1
MAP REFERENCE 548th RTG. USATC, Series 200. Sheet M0380-8HL. 5th ed. July 68. Scale 1:200,000 (SECRET) 25X1		
LATEST IMAGERY USED	NEGATION DATE (If required)	NA 25X1

BASIC DESCRIPTION

Ma-dong Cement Plant No. 1 is located on the southern edge of Masan-ni, 1 km southeast of Ma-dong Cement Plant No. 2. The plant is rail and road served and partly secured by a wall. It occupies an area approximately 1,100 by 750 feet and contains about 25 acres.

This plant produces cement using the wet process. Raw materials are brought in by rail. The plant has two exposed rotary kilns each measuring about 490 feet in length (see Figure 6). Poor-quality photography precludes an accurate determination of kiln diameter. A large stack is associated with each kiln.

Other major plant components include a coal receiving and storage/grinding facility, a raw materials receiving and primary grinding area, five mixing and blending silos, a finishing mill, six finished product storage silos, and a possible thermal power plant.

The plant was complete and operational when first observed in July 1964. Heavy smoke from the stacks limited a detailed analysis of the facilities. In February 1966 a new rail spur had been constructed to the coal receiving and storage facility, and construction activity was evident in the clinker storage area. A building over that area was complete in November 1966. In February 1968 a large building had been constructed next to the kiln building. This is possibly a thermal power plant similar to the one seen at Haeju Cement Company Chosen which converts waste heat into electricity for plant use.

In February 1968 and December 1969, only one stack was seen smoking, indicating that only one of the two kilns was operating. The plant has been seen in full operation with both stacks smoking on all remaining coverage since July 1964.

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INSTALLATION OR ACTIVITY NAME		COUNTRY
Ma-dong Cement Plant No. 2		KN
UTM COORDINATES 51SYC482612	GEOGRAPHIC COORDINATES 38-28-15N 125-50-42E	25X1
MAP REFERENCE 548th RTG. USATC, Series 200, Sheet M0380-8HL, 5th ed, Jul 68, Scale 1:200,000 (SECRET)		
LATEST IMAGERY USED	NEGATION DATE (If required)	25X1
	NA	25X1

BASIC DESCRIPTION

Ma-dong Cement Plant No. 2 is located on the southern edge of Masan-ni, 1 nm northwest of Ma-dong Cement Plant No. 1. The plant is road and rail served and wall-secured. It occupies an area approximately 3,000 by 1,300 feet and contains about 90 acres.

This plant produces cement using both the wet and dry processes. Raw materials are brought in by rail. The plant has four rotary kilns; two are enclosed in a kiln building measuring 530 by 90 feet, and two are exposed and measure 485 by 15 feet (see Figure 7).

Other major plant components include raw materials receiving and grinding sections, a coal receiving and storage area, a coal preparation area, a finishing mill, 16 final product storage silos, and a bagging/shipping facility. A transformer yard is located at the northwest end of the plant. A new finishing mill is under construction near the coal receiving area.

The plant was first observed on photography of September 1950. At that time, it appeared externally complete but had only the two enclosed kilns. In February 1966, a bagging and shipping facility had been constructed next to the final product storage silos. Small roofs were placed on the silos by November 1966. In September 1967, bases for a new kiln were seen next to the kiln building. In September 1968, this third kiln was partially constructed, a stack for it had been built, and bases for a fourth kiln were in place. In November 1968, the fourth stack had been built. By December 1969, the third kiln was externally complete, and the fourth kiln appeared externally complete in March 1970. A finishing mill for the two new kilns was externally complete in January 1971.

The plant was first observed operating in March 1965. At that time, both old stacks were emitting smoke, indicating that the two enclosed kilns were in operation. They were seen operating on all subsequent photography except that of December 1969, when only one stack was smoking. Both of the new kilns were observed in operation for the first time in January 1971, as evidenced by smoke emanating from their stacks.

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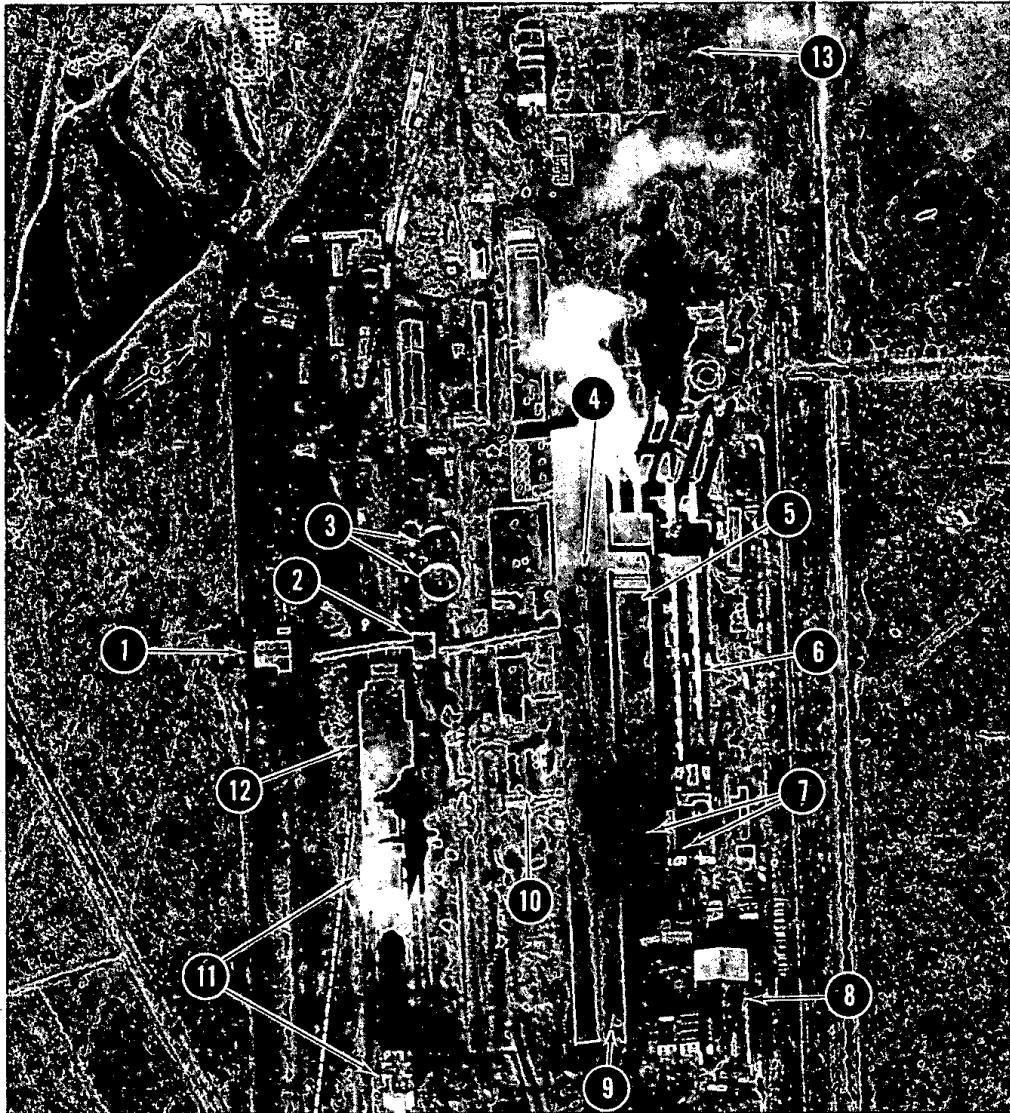


FIGURE 7. MA-DONG CEMENT PLANT NO. 2.

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Key to Annotations

Item	Description
1	Raw materials receiving
2	Raw materials grinding
3	Slurry tanks (2)
4	Clinker storage
5	Kiln building (2 rotary kilns)
6	Rotary kilns (2)
7	Coal preparation
8	Finishing mill (under construction)
9	Coal receiving and storage
10	Final grinding
11	Final product storage silos (16)
12	Bagging and shipping facility
13	Transformer substation



FIGURE 8. SUNCHON CEMENT PLANT,

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Key to Annotations

<u>Item</u>	<u>Description</u>
1	Raw materials receiving
2	Raw materials storage and grinding
3	Mixing and blending silos
4	Slurry tanks (2)
5	Coal receiving and storage
6	Coal grinding
7	Gypsum preparation facility
8	Clinker storage
9	Finishing mill
10	Final product storage silos
11	Rotary kilns (2)

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INSTALLATION OR ACTIVITY NAME		COUNTRY		
Sunchon Cement Plant		KN		
UTM COORDINATES 52SBU422722	GEOGRAPHIC COORDINATES 39-28-20N 126-00-50E	BE NUMBER None	COMIREX NO. None	NIETB NO. None
MAP REFERENCE 15th RTS. USATC, Series 200, Sheet M0380-3HL, 5th ed, Feb 68, Scale 1:200,000 (SECRET)				
LATEST IMAGERY USED		NEGATION DATE (If required)		
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BASIC DESCRIPTION

The Sunchon Cement Plant is located 4.7 nm northwest of Sunchon. The plant is road and rail served. No security measures were observed. The plant occupies an area approximately 1,200 by 600 feet and contains about 21 acres.

This plant will produce cement using the wet process. Raw materials are available from a nearby quarry. There are two exposed rotary kilns each measuring 345 by 11 feet (see Figure 8). Other major plant components include raw materials receiving, storage, and grinding facilities, coal receiving, storage, and grinding facilities, a gypsum preparation facility, a finishing mill, and final product storage silos.

Construction of this plant began between September and November 1968. In October 1969 the kilns were in place, but the rest of the plant was still under construction. By September 1970, only the rail lines, the finishing mill, and the final product storage silos remained incomplete. At that time, light smoke emanating from the stack indicated that the kiln and firing section were probably being tested to assure operability. The plant appeared externally complete in December 1970, but the rail lines were still under construction. No smoke was observed.

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INSTALLATION OR ACTIVITY NAME		COUNTRY
Sunho-dong Cement Plant		KN
UTM COORDINATES 51SYD578191	GEOGRAPHIC COORDINATES 38-59-40N 125-58-40E	25X1
MAP REFERENCE 548th RTG. USATC, Series 200, Sheet M0380-8HL, 5th ed, Jul 68, Scale 1:200,000 (SECRET)		25X1
LATEST IMAGERY USED	NEGATION DATE (If required)	25X1
	NA	

BASIC DESCRIPTION

The Sunho-dong Cement Plant is located on the northern edge of Sunho-dong. The plant is rail and road served. No physical security measures have been identified on the available small-scale photography. The plant occupies an area approximately 2,000 by 800 feet and contains about 37 acres bordered by rail lines.

This plant produces cement using the wet process. Raw materials are brought in by rail from three nearby quarries. The plant has four exposed kilns and one enclosed kiln. The exposed kilns each measure approximately 265 feet in length. Small-scale photography precludes accurate determination of kiln diameter. The enclosed kiln building measures 795 by 90 feet. This measurement includes the coal grinding and firing sections, which cannot be separated from the kiln section on available photography (see Figure 9).

Other major plant components include a large ore preparation facility, two coal receiving and storage areas, a shipping area, two finishing mills, and final product storage silos.

Collocated installations include a lime plant and a large administration and support area. The lime plant shares raw materials supply and processing with the cement plant. The administration and support area serves both plants. A small possible coal mine is west of the plant.

The plant was first observed on photography of September 1950. At that time, only the enclosed kiln was present. Activity at the site of the exposed kilns indicated that they were under construction. Two exposed kilns were observed in place in November 1962. The third exposed kiln was in place in September 1968 and the fourth appeared on October 1969 photography.

The enclosed kiln was observed operating in July 1964, August 1965, September 1968, October 1969, and March 1970. The two older exposed kilns were first seen operating in November 1962, and on all subsequent referenced imagery except 12 November 1968 and October 1969. Haze on the September 1967 coverage precluded a determination of plant operations. The two newest exposed kilns were seen operating for the first time on March 1970 coverage.

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FIGURE 9. SUNGHO-DONG CEMENT PLANT,

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Key to Annotations

Item	Description
1	Kiln building (1 rotary kiln)
2	Slurry tanks (4)
3	Ore preparation facility
4	Rotary kilns (4)
5	Lime plant
6	Administration and support area
7	Finishing mill and shipping facility
8	Clinker storage
9	Coal receiving and grinding
10	Finishing mill and shipping facility
11	Clinker storage
12	Coal receiving and storage
13	Possible coal mine

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